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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/855,321 | 05/14/2001 | Tuomo Suntola | ASMMC.013C2 | 9994 |

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| EXAMINER |
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FULLER, ERIC B

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| ART UNIT | PAPER NUMBER |
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1762

DATE MAILED: 02/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|--------------------------------------|---------------------------------------|--|
| Office Action Summary | Application No. 09/855,321 | Applicant(s) SUNTOLA ET AL. | |
| | Examiner Eric B. Fuller | Art Unit 1762 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-21 and 23-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-21 and 23-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant argues that the amount of purge gas that inherently corresponds to the claimed amount is not taught. This is not found convincing. The present application is alleging that defining an amount of purge gas is a patentable feature. This is not true. The examiner has shown numerous instances where purging is known. The object of purging is to remove as much of the reactant that is not chemisorbed on to the substrate as possible. Thus, using the proper amount of gas to remove reactants from the reaction space, including the walls of the reactor (reactant on the walls are part of the reaction space), is inclusive of the purge step taught in the prior art. As discussed in previous office actions "at least two reactor space volumes" is an obscure and rather non-specific way of describing the amount of purge gas. The conflict between the prior art and the present application in the case history has not been because this limitation is patentable, but because the claims use this obscure unit of measurement that is not easily converted to standard units of measurement without a given reactor volume. Many references use relative flow times, wherein the purge flow time exceeds the reactant flow time by 2-10 times. This is also inclusive of "at least two reactor space volumes". Even if the applicant wishes to argue that the prior art is not inclusive of this limitation, one of ordinary skill knows that the longer one purges, the more reactant may be removed. To optimize the purge time with cost of purge gas would have been at least obvious. Thus, defining a purge amount is not a patentable feature. As to the

added limitations, ALE is explicitly taught in the abstract. The examiner maintains the rejections of the previous Office Action.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 17-21, 23-25 and 32-43 are rejected under 35 U.S.C. 102(b) as being anticipated by Kitahara et al. (US 5,300,186).

Kitahara teaches an atomic layer epitaxy process in a vacuum with a steady pressure of 20 Torr (column 4, lines 45-50). Between reaction pulses, the reactant gases and “any residual component species remaining after the deposition” is purged from the reactor by introducing hydrogen for about three seconds (column 4, lines 60-68). This reads on removing the reactant from the walls of the reactor. The minimum flow rate of hydrogen taught is 2 SLM (standard liters per minute) and according to figure 3 much more than this is used during the purging steps. At a pressure of 20 Torr, which is very small compared to 760 Torrs of standard conditions, a very little amount of gas is required to fill a very large amount of volume, as pressure and volume are inversely proportional according to gas laws. Therefore, even though the volume of the chamber is not explicitly taught, it is the position of the examiner that the flow rates and flow times explicitly taught read on moving multiple reaction space volumes of inactive

Art Unit: 1762

gas through the reaction space for any sized reactor that would be used for coating silicon wafers.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17-21, 23-25 and 32-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahara et al. (US 5,300,186).

Kitahara teaches the limitations above. In the event the applicant disagrees with the Examiners assessment of the flow rate inherently filling multiple reaction space volumes, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to determine the volume of gas required to maximally remove the reactant gas and any residual component species remaining. By doing so, one would reduce contamination. Determining this amount would have been within the skill of one practicing in the art, through routine experimentation.

Claims 26-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitahara et al. (US 5,300,186), as applied to claim 17 above, and further in view of Moore, Sr. (US 3,662,583).

Art Unit: 1762

Kitahara teaches the limitations to claim 17, but is silent to the use of oblong feed pipes. However, Moore teaches that using oblong feed types for feed a process space provides a wider spread of feed gas, such that the process space may be reduced. One of skill in the art would recognize that a smaller process space would result in less feed gas required and/or more efficient purging. Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize oblong feed pipes in the process Kitahara. By doing so, the volume of the process chamber may be reduced, resulting in less feed gas required and more efficient purging (i.e. more require space volumes of purge gas being flowed through the reactor).

Conclusion

Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 1762

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Fuller whose telephone number is (571) 272-1420. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks, can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



EBF



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER